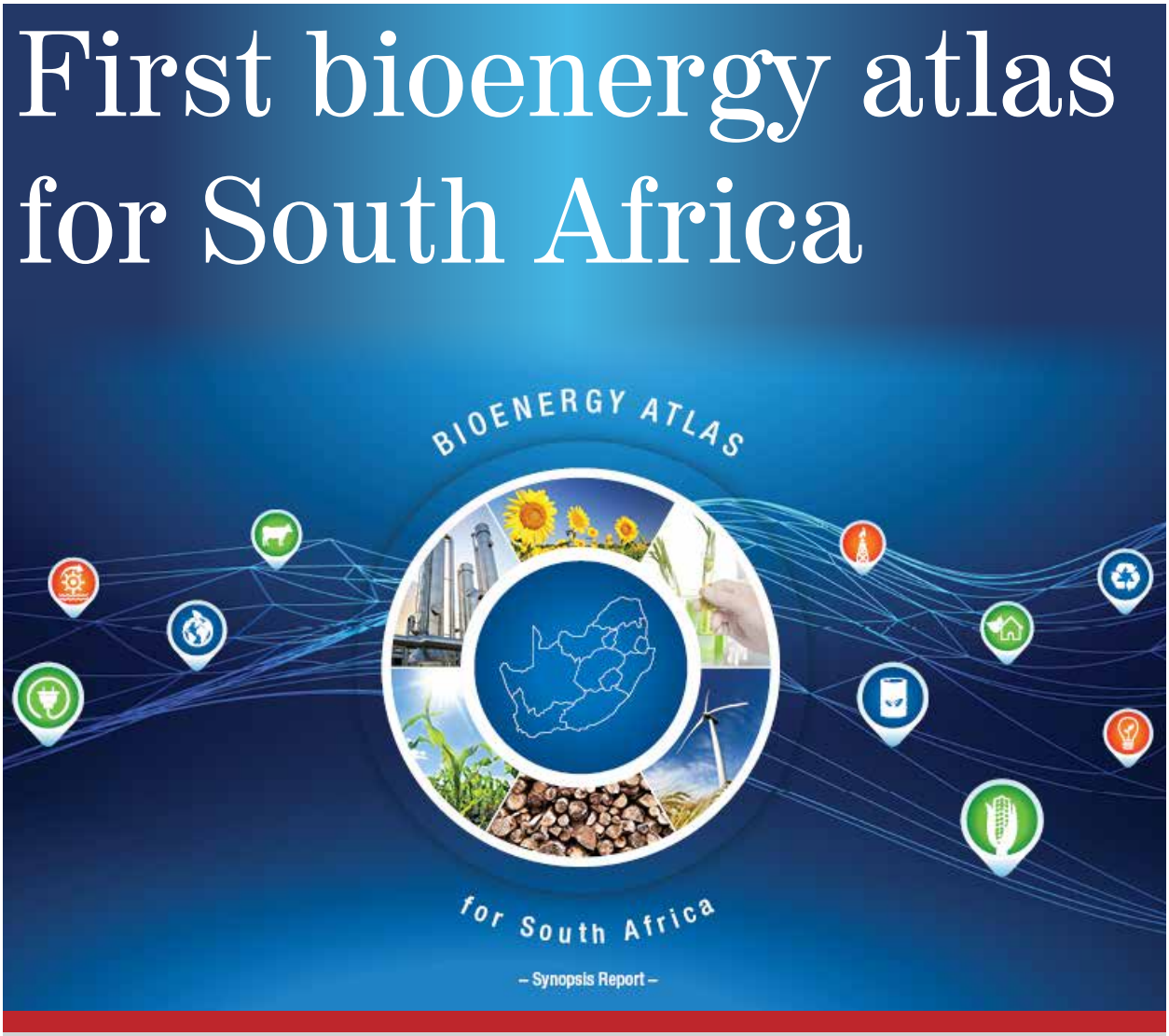
First bioenergy atlas for South Africa



By Department of Science and Technology

In support of efforts to increase South Africa's energy-generation capacity, the Department of Science and Technology developed a Bioenergy Atlas to use as a decision-support tool in energy policy formulation, as well as to guide investments in bioenergy technologies.

The atlas, launched in March 2017, provides information on potential energy resources, their geographic spread, their proximity to infrastructure, and potential end users. The atlas looks at different categories of bioenergy resources like lignocellulose, organic waste and purposely cultivated feedstock.

In an effort to improve the cost competitiveness of delivering alternative energy solutions, the atlas assesses different bioenergy conversion technology pathways. This will enable researchers to prioritise investigations into cost-reduction options in technologies applicable to dominant South African feedstock.

The National Development Plan calls for adequate investment in energy infrastructure so that by 2030 South Africa will have an energy sector that promotes economic growth and development. The plan also envisages that by 2030 South Africa will have a sufficient supply of electricity and liquid fuels to ensure that economic activity and welfare are not disrupted, and that at least 95% of the population have access to grid or off-grid electricity.

The plan envisages that gas and other renewable resources such as the sun, wind and water, as viable alternatives to coal, will supply at least 20 000 MW of the additional 29 000 MW of electricity that will be needed by 2030.

The government aims to ensure that the energy supply is secure and demand is well managed, and that there is an efficient and diverse energy mix for universal access within a transformed energy sector. It will also implement policies that help South Africa adapt to climate change and mitigate its effects.

In developing the atlas, the

DST held discussions with relevant institutions which included universities, government departments, science councils and Eskom before a draft framework was adopted. The framework focused on providing a holistic view of resources that might be used for bioenergy.

KwaZulu-Natal and Mpumalanga could contribute approximately 2 800 MW annually by converting lignocellulose into electricity with an additional 1 400 MW generated using organic waste from serviced households. Lignocellulosic biomass in KwaZulu-Natal and Mpumalanga includes forestry and agricultural residues, while in the Eastern Cape it comes mostly from invasive alien species.

With respect to biofuels, the Eastern Cape and KwaZulu-Natal could produce about 570 million litres of biofuel per annum from land used for subsistence farming and from degraded land. The energy generated from these resources could have an impact on both energy access and job creation in the targeted areas. The atlas is able to provide details of available resources at a resolution of 5 km by 5 km, thus assisting local governments with feasibility assessments for energy projects.

The proximity and ability of various kinds of energy infrastructure (decommissioned, operational and planned) to service the target markets was also evaluated. The findings indicate that most of the current energy infrastructure deployment focuses on supporting economic activity/sectors, and limited attention is given to addressing social challenges such as energy access. Additional infrastructure will be required to provide more rural communities with electricity.

There is good infrastructure cover in areas where biomass production is high and most biomass potential is within the reach of existing and planned energy or agricultural infrastructure. However, some biomass resources in rural areas will require new infrastructure, particularly in the Eastern Cape, KwaZulu-Natal and Limpopo.

The Eastern Cape has the potential to contribute approximately 500 MW of additional electricity-generation capacity and approximately 150 million litres of biofuels. The province of KwaZulu-Natal could contribute about 600 MW of additional electricity and 200 million litres of biodiesel capacity, and Limpopo could contribute approximately 100 MW from Polokwane.

The atlas projections regarding the number of people in low-income groups that could benefit from access to modern energy services is 125 000 in the Eastern Cape, 365 000 in KwaZulu-Natal, 268 000 in Limpopo, and 106 000 in the North West.

“The atlas projections regarding the number of people in low-income groups that could benefit from access to modern energy services is 125 000 in the Eastern Cape, 365 000 in KwaZulu-Natal, 268 000 in Limpopo, and 106 000 in the North West.”

In addition, the people who might benefit from job creation in the biomass cultivation or harvesting sectors could be as many as 60 000 in the Eastern Cape, 35 000 in KwaZulu-Natal, and 30 000 in Limpopo. However, these jobs are seasonal and, in the case of invasive species eradication, will be for a period of two to five years only.

The estimates for manufacturing and processing jobs that could result in major rural areas are approximately 2 000 in the Eastern Cape, 700 in KwaZulu-Natal, and 300 in Limpopo.

The atlas provides a comparative analysis of different conversion processes in terms of efficiency and viability. It uses models to forecast estimated yields or production, determine feedstock properties (including calorific values), and the full value chain impact of bioenergy resources.

The DST will share the Bioenergy Atlas with the rest of government, particularly the Department of Energy and the Department of Cooperative Governance and Traditional Affairs, to ensure that the atlas influences energy planning in all spheres of government. The atlas can be used to enhance decision making around key programmes such as the Working for Energy programme, the National Biogas Platform and the Rural Electrification Programme, which deploy energy technologies to deal with the triple challenge of unemployment, inequality and poverty. ■

For more information go to www.dst.gov.za

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA